

REMARKS

Status of the Claims

Claims 2 – 4, 7 – 11, 16 – 18, 24, and 27 – 30 are pending, with claim 24 being independent. Without conceding the propriety of the rejections, claim 24 has been amended to even more clearly recite and distinctly claim Applicant's invention. Support for the amendment can be found throughout the specification, including, in the original claims. Therefore, no new matter has been added.

Applicant respectfully requests the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendments, the following remarks, and the attached declaration.

The Present Invention

The presently claimed invention relates to a process for minimizing formation of heavy molecular weight products from reactive oxygenate and hydrocarbon unsaturates in a hydroconversion feed stream during heating prior to the hydroconversion process. The presently claimed process comprises at least one preheating step prior to a heating step for achieving hydroconversion reaction temperature.

The presently claimed process comprises adding a hydrogen containing gas stream to the hydroconversion feed stream ***prior to the at least one preheating step*** and not under hydroconversion conditions to form a mixed stream. The first hydrogen-containing gas is added in an amount ***less than about 100 SCFB*** and the first hydrogen-containing gas is sufficient to reduce the amount of heavy molecular weight products formed during the preheating as compared to a heated hydrocarbon stream without added hydrogen. After the first hydrogen-containing gas is added, the mixed stream is ***then preheated***. The first hydrogen-containing gas is added to reduce the amount of heavy molecular weight products formed during preheating, which ***protects the preheat equipment*** in the hydroconversion process. The preheat equipment includes shell and tube heat exchangers.

To the preheated mixed stream is added a ***second hydrogen-containing gas***, sufficient to effect hydroconversion of the mixed stream, to form a hydroconversion feed stream. The

hydroconversion feed stream is then heated to reaction temperature, and the hydroconversion feed stream is hydroconverted.

Claim Rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a)

Claims 2-4, 7-11, 16-18, and 24-30 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,080,397 (“Derr”) in view of U.S. Patent No. 5,738,779 (“Dach”). Applicant respectfully disagrees with this rejection; therefore, the rejection is traversed.

Derr discloses upgrading of 350°F plus product of Fischer-Tropsch Synthesis by hydrotreating the Fischer-Tropsch Synthesis product and selective cracking the hydrotreated material boiling above about 600°F. In the process of Derr, a feed comprising oxygenates is introduced to the process by a conduit ***after indirect heat exchange*** in process equipment, not shown in the Figures, to raise the temperature thereof to about 470°F. The ***preheated feed is admixed with hydrogen rich make up gas*** alone or in combination with recycle hydrogen rich gas. The preheated mixture is then passed to ***a furnace*** wherein the charge mixture is raised to an elevated temperature within the range of about 550°F up to about 675°F (*i.e.*, reaction temperature). Derr discloses that it is important to limit vaporization of the feed to less than about 85% vaporization to prevent fouling and plugging of the furnace tubes due to polymerization of the olefinic and/or di-olefinic hydrocarbons contained therein. Derr discloses that the hydrogen rich gas may be added to the preheated stream ***upstream of the furnace*** to help to reduce or minimize the fouling of the furnace tubes or coils and effect a regulation of the temperature therein so that from about 15 to 25 percent by weight of the feed is retained in the liquid phase (*i.e.*, vaporization is limited to less than about 85%, as indicated desirable above). (Col. 11, lines 13 – 35).

Dach discloses using a two phase flow splitter in combination with parallel heat exchanger trains for heat transfer stability in a hydrotreating process, thereby avoiding flow maldistribution of liquid and vapor between heat exchanger trains without more complex feedback control. As cited by the Examiner, in the “Description of Other Related Methods in the Field” section, Dach discloses that hydrogen and oil may be mixed either upstream or downstream of the feed/effluent exchangers and mixing upstream of the exchangers provides greater temperature differentials, higher heat transfer coefficients and reduced fouling.

Applicants provide herewith a declaration under 37 C.F.R. § 1.132 by Richard O. Moore, Jr., an expert in the field of downstream processing. As set forth in the declaration, it was well known to those of skill in the art that significant amounts of hydrogen must be added to affect the temperature differentials and heat transfer coefficients of a heat exchanger, as disclosed in Dach. As concluded in the declaration, for the process disclosed in Dach, hydrogen rates of *at least 750 SCF/Bbl* would be required and it is *not possible* for hydrogen addition rates of *100 SCF/Bbl* to noticeably affect the stated change in exchanger performance. In addition, the “Background of the Invention” section of the present application provides a similar description of known prior art processes as Dach. As described in the “Background of the Invention” section of the present application, it was known to engineers skilled in heat exchanger design to combine the hydrocarbon feed and a large quantity of hydrogen-rich gas (e.g. greater than 750 Standard Cubic Feet per Barrel (SCFB)) before entering the heat exchanger so that the large quantity of hydrogen-rich gas would act as a velocity maintaining agent to avoid the deposition of particulate matter in the feed. (specification, page 2, lines 12-19).

In contrast, as described above, the presently claimed invention relates to a process for minimizing formation of heavy molecular weight products from reactive oxygenate and hydrocarbon unsaturates in a hydroconversion feed stream during heating prior to the hydroconversion process. The presently claimed process comprises adding a hydrogen containing gas stream to the hydroconversion feed stream *prior to the at least one preheating step* and not under hydroconversion conditions to form a mixed stream, wherein the first hydrogen-containing gas is added in an amount *less than about 100 SCFB* and the first hydrogen-containing gas is sufficient to reduce the amount of heavy molecular weight products formed during the preheating as compared to a heated hydrocarbon stream without added hydrogen.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

MPEP § 2143.

Applicant respectfully submits that even if there were some suggestion or motivation to combine Derr and Dach and a reasonable expectation of success, Derr and Dach, even if combined, do not disclose or suggest all the claim limitations of the presently claimed invention. As described above, Derr discloses *preheating a feed* and then *admixing the preheated feed* with hydrogen rich gas. Derr does not disclose or suggest adding a *first hydrogen-containing gas* to a hydrocarbon stream *prior to preheating* and not under hydroconversion conditions, wherein the first hydrogen-containing gas is added in an amount less than about 100 SCFB and the first hydrogen-containing gas is sufficient to reduce the amount of heavy molecular weight products *formed during preheating* as compared to a heated hydrocarbon stream without added hydrogen. Also as described above and set forth in the declaration, Dach discloses adding significant amounts of hydrogen, at rates of *at least 500 SCF/Bbl*, to affect the temperature differentials and heat transfer coefficients of the heat exchanger. Dach does not disclose or suggest adding a first hydrogen-containing gas to a hydrocarbon stream prior to preheating and not under hydroconversion conditions, wherein the first hydrogen-containing gas is added in an amount *less than about 100 SCFB* and the first hydrogen-containing gas is sufficient to reduce the amount of heavy molecular weight products formed during preheating as compared to a heated hydrocarbon stream without added hydrogen.

Accordingly, it is respectfully submitted that if Derr and Dach are combined, they do not disclose or suggest all the claim limitations. Therefore, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Conclusion

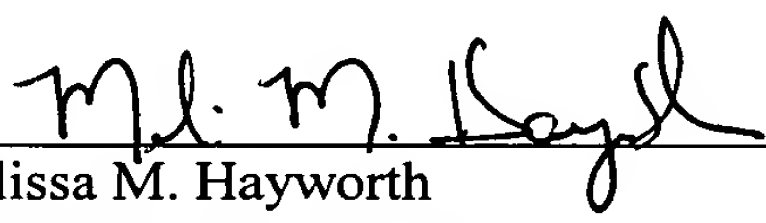
Without conceding the propriety of the rejections, claim 24 has been amended to even more clearly recite and distinctly claim Applicant's invention. For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims. In view of the foregoing amendments and remarks and the attached declaration, reconsideration of the claims and allowance of the subject application is earnestly solicited

In the event that there are any questions relating to this application, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

In the event any further fees are due to maintain pendency of this application, the Examiner is authorized to charge such fees to Deposit Account No. 02-4800.

Respectfully submitted,

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